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(56) Documents Cited

**EP 0650122 A1 EP 0259912 A1 WO 95/19002 A1
WO 92/14204 A1 US 5133065 A
Dialog record 01791933 of HP Professional, v9, n5,
p61(1), May 1995 Dialog record 01537874 of PC Week,
v9, n39, p14(1), 28 Sept 1992, Berlind D**

(58) Field of Search

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On-line: WPI, Inspec, Computer

(54) Data backup/restore devices

(57) A data backup/restore device 1, which is not itself a computer workstation or file server, is provided for backing up and restoring data supplied over a local area network 3 comprising at least one computer workstation and optionally a file server interconnected by network connection means. The device 1 comprises a data storage device 2, a storage device controller 4, a decoder/encoder 8 and a LAN interface 9 for connection to the network connection means separately from a computer workstation or file server, and a LAN co-processor 6 for transferring data between the data storage device 2 and the computer workstation. Such a data backup/restore device 1 can be connected to the local area network 3 at a location remote from any computer workstation or file server within the network, and is capable of performing data backup/restore operations and data interchange with any computer workstation or file server (where at least one file server is provided) without the need for direct connection to the computer workstation or file server and without the need to load and run any software on the file server.

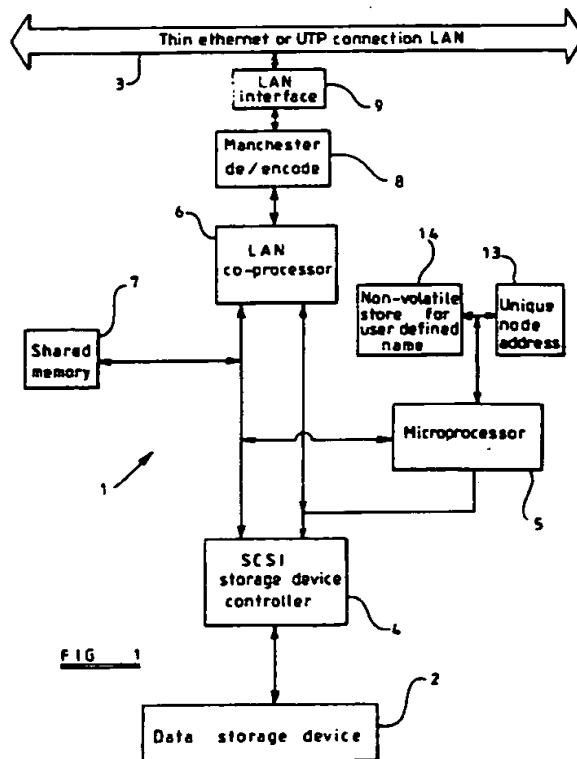


FIG 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995

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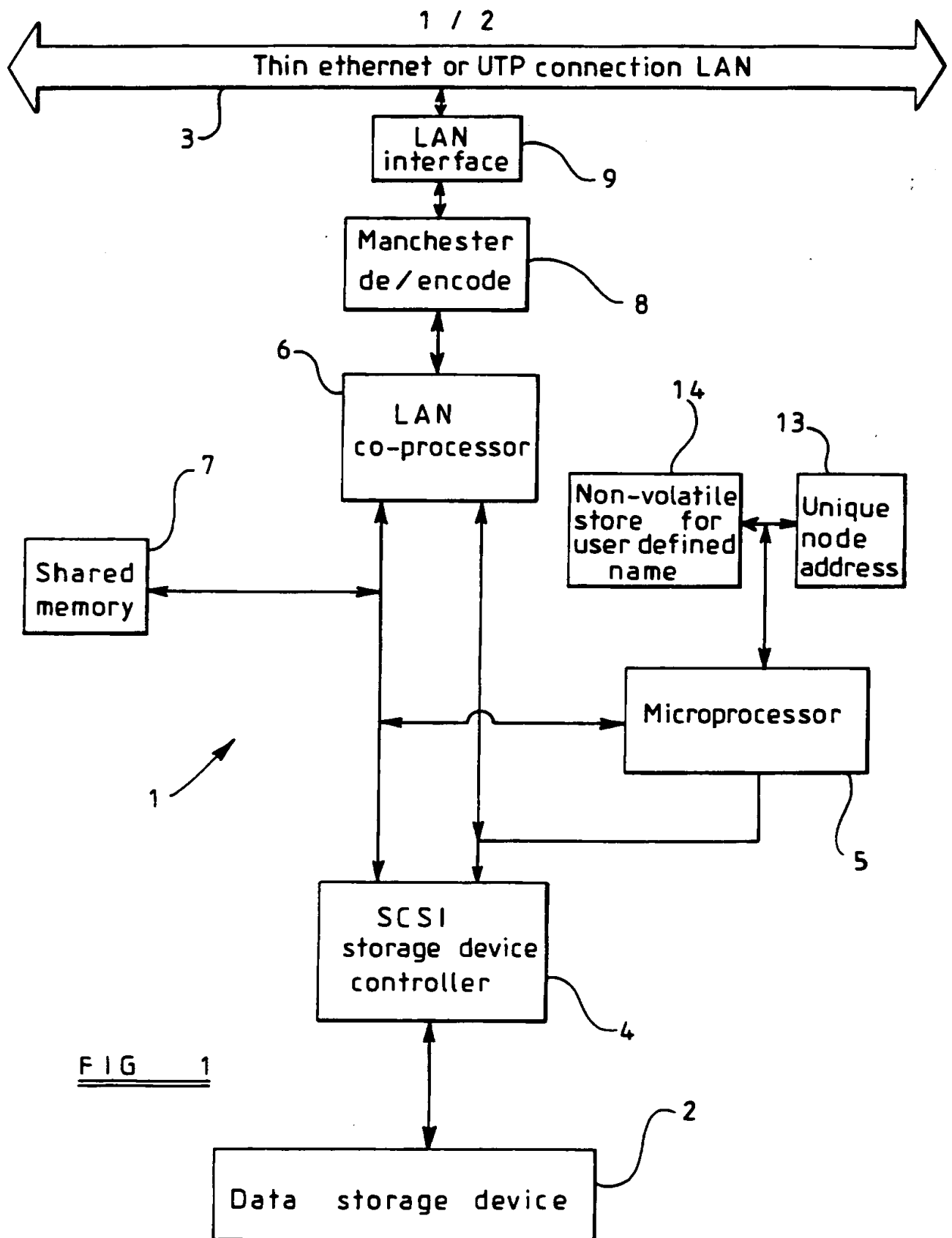


FIG 1

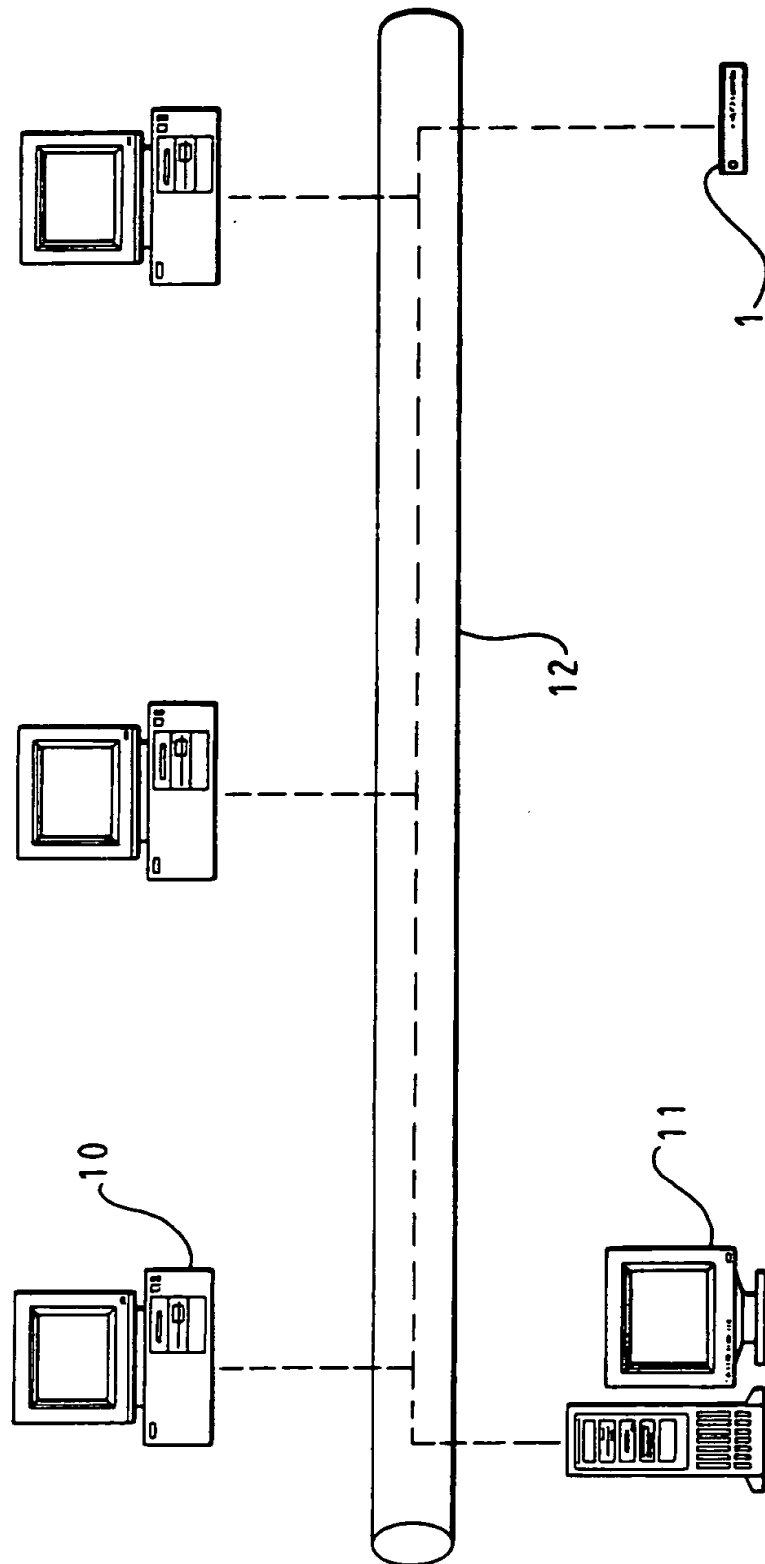


FIG 2

"Data Backup/Restore Devices"

This invention relates to data backup/restore devices for backing up and restoring computer data.

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Three basic forms of data backup/restore device are currently commercially available for use with a personal computer (PC). A first type of backup/restore device is internally mounted within, and internally connected to, the computer. In this case backup/restore software is contained within the computer and controls the backup/restore functions locally within the computer. A second type of backup/restore device is separately cased and is connected externally to the computer, either using a specialised interface card, or by way of the computer parallel port connector. In this case the backup/restore software is again contained within the computer and controls the backup/restore functions locally. A third type of backup/restore device is connected either internally or externally to the file server of a local area network (LAN) at a location remote from each PC workstation of the network. The main backup/restore software is in this case contained within the file server and must be loaded and resident at all times. Each PC workstation runs a local agent software to communicate with the file server.

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It will be appreciated that such backup/restore devices are either designed to be used with a particular computer to which the device is connected, or to be used with a file server in a local area network. Thus, in a local area network, it is necessary either for a separate backup/restore device to be connected to each PC

workstation to be backed up, and/or for a common backup/restore device to be connected to the file server for backing up a number of workstations and/or the file server under control of software resident in the file server.

5 It is an object of the invention to provide a backup/restore device which is capable of being used for backing up and restoring data supplied over a local area network without needing to be connected directly to any computer workstation or file server within the network.

10 According to the present invention there is provided a data backup/restore device for backing up and restoring data supplied over a local area network comprising at least one computer workstation and optionally a file server interconnected by network connection means, wherein the device is not itself a computer workstation or file server, and wherein the device comprises data storage
15 means, device connection means for connection to the network connection means separately from a computer workstation or file server, and data transfer means for transferring data between the data storage means and said at least one computer workstation by way of the device connection means and the network connection means.

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 Such a data backup/restore device can be connected to the local area network at a location remote from any computer workstation or file server within the network, and is capable of performing data backup/restore operations and data interchange with any computer workstation or file server (where at least one file

server is provided) without the need for direct connection to the computer workstation or the file server and without the need to load and run any software on the file server. The device may be adapted to be connected to any local area network so as to be capable of data interchange with any computer workstation or file server on the network by communication over the network using an appropriate protocol and independently of the network operating system. Since the device is a dedicated backup/restore device, it will not include a computer keyboard or display so that the device is inexpensive to produce and to connect to the network. Furthermore, since the device is connected to the network independently of any computer workstation or file server, it is possible for the device to be located in any convenient location, without requiring to be positioned adjacent to, or to be associated with, a particular computer workstation or file server, so that a single device may be used for backing up a number of workstations on the network. Thus the number of backup/restore devices required in a particular network installation can be considerably decreased as compared with the case in which each workstation is provided with its own backup/restore device.

The backup/restore device preferably incorporates microprocessor means for controlling the backing up of data from said at least one computer station to the data storage means and the restoring of data from the data storage means to said at least one computer workstation.

The data transfer means preferably includes local area network coprocessor means for interchange of data packets with device driver means of said at least one

computer workstation so as to enable the backup/restore functions of the device to be controlled by command data transmitted from said at least one computer workstation and so as to provide for the interchange of data to be backed up or restored.

5 Furthermore the device advantageously includes address means for supplying a unique network node address in response to an interrogation signal from said at least one computer workstation. This provides the device with a unique identity and enables more than one such device to be connected to a single local area network provided that each device has a different network node address. The device
10 may include non-volatile memory means for storing a unique identifier capable of identifying the device at all times.

 The data transfer means may be adapted to exchange data with the device driver means of said at least one computer workstation by means of an interactive
15 packet protocol by which data is transferred across the local area network in small packets, each packet being acknowledged and checked for integrity by the data transfer means.

 The data storage means may comprise a storage device and a storage device
20 controller. The storage device may be a tape drive or a magnetic or magneto-optical disk drive. The disk drive may be a hard disk drive or an optical re-writable disk drive or a writable CD-ROM disk drive, or even a combination of such drives in a multiple drive configuration. In each case a removable storage medium, such as a tape or disk, may be provided for storage of data and for subsequent removal from

the storage device for safe keeping.

Furthermore the device connection means may include decoder/encoder means, such as a Manchester decoder/encoder, and network interface means, such as
5 a Thin Ethernet interface, a UTP interface or a Token Ring interface, for connection to the network connection means.

In order that the invention may be more fully understood, a preferred embodiment of data backup/restore device in accordance with the invention will now
10 be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a block diagram of the device; and

Figure 2 is a schematic diagram of a local area network (LAN) incorporating such a device.

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Referring to Figure 1 the data backup/restore device 1 comprises a SCSI data storage device 2, such as a tape drive or disk drive, and associated control circuitry packaged within an appropriate casing (not shown) and provided with an appropriate power lead and connector port for connection of the device to a Thin
20 Ethernet or UTP connection LAN 3 by means of an appropriate connection lead. As shown diagrammatically in Figure 2, the LAN comprises at least one PC workstation 10 and optionally at least one file server 11 interconnected by Thin Ethernet or UTP cable 12. At least one PC workstation should be loaded with appropriate backup/restore device driver software.

The control circuitry of the backup/restore device 1 comprises a SCSI storage device controller 4, a microprocessor 5, a LAN coprocessor 6 and a shared RAM memory 7. The microprocessor 5 runs firmware stored in an EPROM in order to control the functioning of the data storage device 2 by way of the controller 4, as well as the transfer of data to and from the data storage device 2, when appropriately instructed by the LAN coprocessor 6. The microprocessor 5, the controller 4 and the LAN coprocessor 6 share the RAM memory 7 which is used for temporary data storage. The LAN coprocessor 6 is connected to the LAN 3 by way of a Manchester decoder/encoder 8 for decoding/encoding of clock bits in the data stream, and a LAN interface which provides the appropriate digital/analogue conversion of the data stream.

When a PC workstation user requires to back up file data to, or restore file data from, the device 1, the backup/restore device driver loaded on the workstation is invoked by the user under keyboard control and used to interrogate the LAN 3 to determine whether any backup/restore device 1 is connected to the LAN 3. The backup/restore device 1 connected to the LAN 3 will indicate its presence by transmitting a unique network node address from an address memory 13, and the device driver will recognise this address and interpret the device status from the signal returned by the device. The backup/restore device driver on the workstation will offer the user a choice of any backup/restore devices 1 that it finds by recognising the transmitted node addresses. The device driver presents a virtual SCSI device to the backup/restore software, and serves to transmit individual SCSI commands received from the backup/restore software over the LAN 3 to the device

1 and to transmit and receive the backup/restore file data. On selection of the appropriate backup/restore device 1, the device driver transfers SCSI commands over the LAN 3 using the low level interactive IPX packet protocol which contains an exhaustive error checking and retry algorithm and which enables the data throughput
5 across the LAN to be maximised. The LAN coprocessor 6 of the device 1 acknowledges and checks each data packet for integrity and to determine that it is addressed to the device 1 and then interprets the packets, each of which contains a number of data bytes. When the LAN coprocessor 6 recognises a storage device command built up from a sequence of such packets, this is supplied to the stored
10 memory 7 for use by the microprocessor 5. The microprocessor 5 then sends the command to the controller 4 which controls the data storage device 2 to perform the requested function. The backup/restore file data broken up into packets by the device driver is then transmitted across the LAN 3 using the same packet protocol, the shared memory 7 being used to buffer the blocks of data, and the microprocessor 5
15 controls the data storage device 2 to receive or transmit the data.

The data transfer is independent of other network traffic which means that the device 1 can transfer data to or from a PC workstation over the network whilst all other regular network traffic proceeds as normal. The existence of a file server
20 on the LAN 3 is not mandatory since none of the backup/restore software runs on the server, although a file server will generally be present on a typical LAN and the contents of a hard drive of the file server can be backed up to, or restored from, the device 1 under control of a PC workstation, if required. If required a number of workstations can communicate with a corresponding number of backup/storage

devices 1 over the LAN 3 simultaneously and independently.

Each backup/restore device 1 can be assigned a name by the user, such as "Accounts Media Station", in order to make human recognition of the device more meaningful. The name (which can be up to 48 characters in length) is stored in a non-volatile memory 14 within the device 1 and is displayed by the workstation, instead of the node address, to enable the device 1 to be identified on the LAN. Furthermore the device 1 may be adapted to periodically announce its presence on the LAN by sending out a broadcast message containing its unique node address.

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The above described backup/restore device, which may be termed a Media Station in view of its ability to back up all types of data, is particularly convenient to use in a local area network as it avoids the need to fix extra interface boards within the PC workstations, and enables the backup/restore device to be connected anywhere on the LAN without having to be located close to either a workstation or a file server. It also enables a common backup/restore device to be used for backing up a number of work stations. Furthermore no software module is required to be resident on the file server. If required a number of such backup/restore devices can be connected to the network and accessed simultaneously.

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CLAIMS

1. A data backup/restore device for backing up and restoring data supplied
5 over a local area network comprising at least one computer workstation and optionally
a file server interconnected by network connection means, wherein the device is not
itself a computer workstation or file server, and wherein the device comprises data
storage means, device connection means for connection to the network connection
means separately from a computer workstation or file server, and data transfer means
10 for transferring data between the data storage means and said at least one computer
workstation by way of the device connection means and the network connection
means.
2. A device according to claim 1, wherein the device incorporates
15 microprocessor means for controlling the backing up of data from said at least one
computer work station to the data storage means and the restoring of data from the
data storage means to said at least one computer workstation.
3. A device according to claim 1 or 2, wherein the data transfer means
20 includes local area network coprocessor means for interchange of data packets with
device driver means of said at least one computer workstation so as to enable the
backup/restore functions of the device to be controlled by command data transmitted
from said at least one computer workstation and so as to provide for the interchange
of data to be backed up or restored.

4. A device according to claim 1, 2 or 3, wherein the device includes address means for supplying a unique network node address in response to an interrogation signal from said at least one computer workstation.

5 5. A device according to any preceding claim, wherein the device includes non-volatile memory means for storing a unique identifier capable of identifying the device at all times.

10 6. A device according to any preceding claim, wherein the data transfer means is adapted to exchange data with device driver means of said at least one computer workstation by means of an interactive packet protocol by which data is transferred across the local area network in small packets, each packet being acknowledged and checked for integrity by the data transfer means.

15 7. A device according to any preceding claim, wherein the data storage means comprises a storage device and a storage device controller.

8. A device according to claim 7, wherein the storage device is a tape drive or a magnetic or magneto-optical disk drive.

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9. A device according to claim 7 or 8, wherein a removable storage medium, such as a tape or disk, is provided for storage of data and for subsequent removal from the storage device for safe keeping.

10. A device according to any preceding claim, wherein the device connection means includes decoder/encoder means, such as a Manchester decoder/encoder, and network interface means, such as a Thin Ethernet interface, a UTP interface or a Token Ring interface, for connection to the network connection means.

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11. A data backup/restore device substantially as hereinbefore described with reference to the accompanying drawings.

12. A local area network incorporating a backup/restore device according to
10 any preceding claim.



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Claims searched: 1 to 12

Examiner: B G Western
Date of search: 12 June 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.O): G4A AER AES AME

Int CI (Ed.6): G06F 11/14

Other: On-line : WPI, INSPEC, COMPUTER

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	EP-0650122-A1 FRANCE TELECOM See whole document	1-10
X	EP-0259912-A1 HEWLETT-PACKARD N.b. cols 1-15	1-3,6-10
X,E	WO-95/19002-A1 RIETSCH N.b. pp 3-10, Figs 1-3	1,2,6-10
X	WO-92/14204-A1 GIGATREND N.b. pp 6-7, Figs 1,5A	1-3,6-10
X	US-5133065-A CHEFFETZ et al N.b. cols 3-6	1,2,7,8,9
X	Dialog record 01791933 of HP Professional, v9, n5, p61(1), May 1995, "QStar expands MastarMind with backup and restore"	1-10
X	Dialog record 01537874 of PC Week, v9, n39, p14(1), 28 Sept 1992, Berlind D, "Intel's backup entry needs work ..."	1-10

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.
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